MYCOTAXON

ISSN (print) 0093-4666 (online) 2154-8889 © 2016. Mycotaxon, Ltd.

July–September 2016—Volume 131, pp. 717–721

http://dx.doi.org/10.5248/131.717

Diorygma fuscum sp. nov. from China

Jian Li & Ze-Feng Jia*

College of Life Sciences, Liaocheng University, Liaocheng, 252059, China

* Correspondence to: *zfjia2008@163.com*

Abstract—A new lichen species, *Diorygma fuscum*, is described from Fujian Province, China. It is characterized by the conspicuous open immersed lirellae with densely white pruinose discs, the hyaline to brownish muriform ascospores sized 40–60 × 12–18 µm, and the presence of stictic acid. The type specimen is deposited in HMAS-L.

Key words—*Ascomycota*, *Ostropales*, *Graphidaceae*, taxonomy

Introduction

Diorygma Eschw. (*Graphidaceae*) is mainly a tropical to subtropical genus (Staiger 2002; Kalb et al. 2004), characterized by its inconspicuous pseudocortex, lirellate ascocarps with a pruinose disc, branched or anastomosing paraphyses with a thick gelatinous wall, *Graphis*-type 1–8-spored asci, ascospores that are transversely septate with lenticular spore locules or muriform, and the presence of norstictic, stictic, and/or protocetraric acid. At present, more than 50 species are known worldwide (Kalb et al. 2004; Cáceres 2007; Archer 2009; Makhija et al. 2009; Sharma & Makhija 2009a, b; Sharma & Khadilkar 2012; Lima et al. 2013; Feuerstein et al. 2014; Sutjaritturakan et al. 2014).

Nine *Diorygma* species have been reported from China: *D. hieroglyphicum*, *D. hololeucum*, *D. junghuhnii* [= *Graphina mendax*], *D. macgregorii*, *D. megasporum*, *D. pachygraphum*, *D. poitaei* [= *Graphina virginea*], *D. pruinosum*, and *D. soozanum* [≡*Graphina soozana*] (Jia & Wei 2016, Kalb et al. 2004, Lamb 1963, Meng & Wei 2008, Nakanishi et al. 2003, Thrower 1988, Wang Yang & Lai 1973, Wei 1991, Wei et al. 2013, Wu & Qian 1989, Zahlbruckner 1933). Here we describe a new species collected in Fujian Province, China, for which we propose the name *Diorygma fuscum*.

Materials & methods

Specimens are housed in Herbarium Mycologicum Academiae Sinicae-Lichenes, Beijing, China (HMAS-L). A dissecting microscope (Olympus SZX12) and a light microscope (Olympus BX51 & Nikon Eclipse-55i) were used for the morphological and anatomical studies. Measurements and illustrations were taken from the manual cross-sections of fruit bodies in water. Amyloidity of the ascospores was tested using Lugol's solution. Spot tests with KOH (20%) were performed on the thallus surface and on thin thallus sections. The lichen substances were detected and identified by thin-layer chromatography (Culberson & Kristinsson 1970; Culberson 1972; White & James 1985).

Taxonomy

Diorygma fuscum Jian Li bis & Z.F. Jia, **sp. nov.** Pl. 1

Fungal name FN 570263

Differs from *Diorygma pruinosum* by its smaller ascospores and the presence of stictic acid.

Type: China. Fujian Province, Jianou City, Fangdao Town, Wanmulin, 27°02′N 118°08′E, alt. 310 m, on bark, 3/VI/2007, Q.F. Meng FJ1280 (**Holotype**, HMAS-L 137193).

Etymology: The epithet refers to the brownish mature muriform ascospores.

Thallus crustose, pale grey to olive-grey, 60–100 µm thick, surface uneven to slightly rugose or warty, without soralia or isidia; pseudocortex indistinctly developed, 5–10 µm thick, partly lacking; algal layer 30–40 µm thick; medulla poorly developed.

Ascocarps numerous, lirellate, often flexuous branched, immersed in the thallus when young, becoming open and ± raised when older, whitish, powdery, acute or rounded at the ends, 1–4 × 0.3–2 mm; disc surrounded by entire (in young apothecia) raised thalline margins, opened, rarely ± convex, with thick and white pruina, often showing fissures when older; exciple divergent, laterally uncarbonized, rudimentarily developed, consisting of a weakly and irregularly or brownish hyphal tissue intermingled with parts of the substrate, carbonization sometimes restricted to the basal position; hymenium 100–180 µm high, not inspersed, I+ weakly bluish violet; epithecium usually distinctly developed, consisting of intermingled anastomosing, hyaline or brownish paraphysis tips with short ± globular cells, hyaline granules, and dead hyphae; paraphyses 1–2 µm diam., with a thick gelatinous wall, often anastomosing, especially in the upper part of the hymenium and near the asci. Ascospores 8 per ascus, hyaline to brownish (when mature), muriform, spore locules of equal size, often arranged in rows, 10–14/3–4-locular, 40–60 × 12–18 µm, I+ violet, with thin halo.

Pycnidia not seen.

Corticolous.

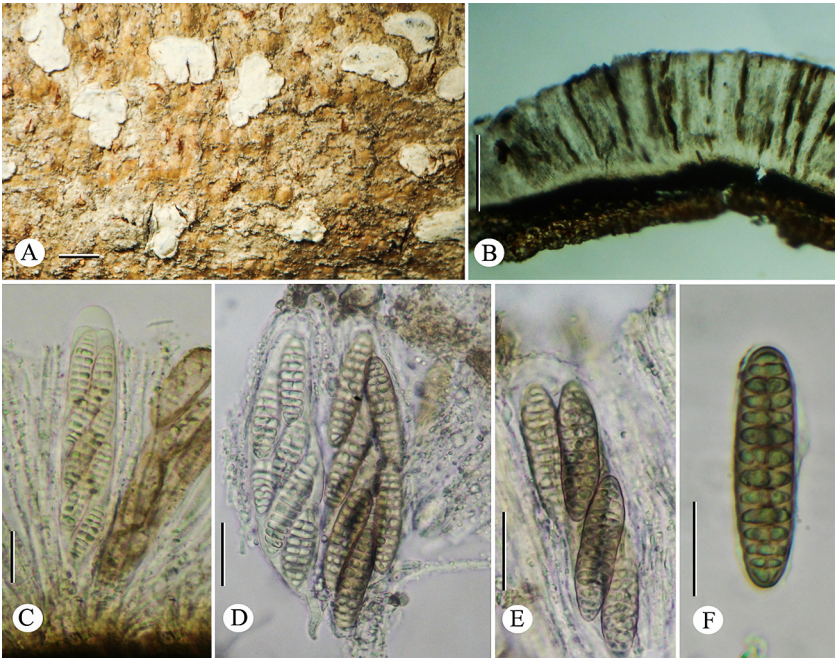

Plate 1. (holotype, HMAS-L 137193). A. Thallus with apothecia; B. Cross-section of apothecium; C. Asci with ascospores, showing the thickened top of ascus; D. Asci with hyaline to brownish ascospores. E. Ascus with brownish ascospores. F. Mature ascospore with thin halo. Scale bars: A = 1 mm; B = 100 μm; C–F = 20 μm.

Chemistry: Stictic acid (major), constictic, hypostictic and hypoconstictic acids (minor, trace or absent).

Additional specimens examined: **CHINA. Fujian Province, Jianou City**, Fangdao Town, Wangmulin, alt. 400 m, 1/VI/2007, Q.F. Meng FJ1059 (HMAS-L 137198); alt. 420 m, 1/VI/2007, Q.F. Meng FJ860 (HMAS-L 137197); alt. 310 m, 3/VI/2007, Q.F. Meng FJ697 (HMAS-L 137196), FJ1278 (HMAS-L 137195), FJ1279 (HMAS-L 137194); alt. 300 m, 3/VI/2007, J. Li FJ630 (HMAS-L 137200); alt. 540 m, 2/VI/2007, J. Li FJ1066 (HMAS-L 137199).

Ecology. *Diorygma fuscum* grows on bark in relatively dry and open situations from lowland primeval forests in subtropical area of China. Associated lichens include *Graphis hossei* Vain. and other species of *Graphidaceae* and *Lecanora*.

Remarks: *Diorygma fuscum* is morphologically similar to *D. pruinosum* (Eschw.) Kalb et al., which differs in having 1-spored asci, larger ascospores (95–170 × 19–50 μm), and the presence of protocetraric acids. The new lichen

species also resembles *D. erythrellum* (Mont. & Bosch) Kalb et al. and *D. poitaei* (Fée) Kalb et al. in producing 8-spores per ascus and similarly sized muriform ascospores (30–65 × 12–20 µm in *D. erythrellum*; 40–65 × 10–18 µm in *D. poitaei*), but differs in having opened discs, a slightly carbonized proper exciple at the base, and the presence of stictic acid (major); *D. erythrellum* differs in containing norstictic acid (major), connorstictic acid (minor or trace), and stictic acid (trace or absent), while *D. poitaei* contains hypostictic and hypoconstictic acids (major) and α-acetylhypoconstictic, constictic, and stictic acids (minor, trace or absent) (Kalb et al. 2004).

Acknowledgements

This study was supported by the National Natural Science Foundation of China (31270066, 31093440, 31493010 & 31493011). The authors are grateful to Dr. Santosh Joshi (CSIR-National Botanical Research Institute, Lucknow, India) and Dr. Hua-Jie Liu (College of Life Sciences, Hebei University, China) for reading and improving the manuscript, and for acting as presubmission reviewers.

Literature cited

Archer AW. 2009. *Graphidaceae*. Flora of Australia 57 (Lichens 5): 84–194.

Cáceres MES. 2007. Corticolous crustose and microfoliose lichens of northeastern Brazil. Libri Botanici 22. 168 p.

Culberson CF. 1972. Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. Journal of Chromatography 72: 113–125. http://dx.doi.org/10.1016/0021-9673(72)80013-X

Culberson CF, Kristinsson H. 1970. A standardized method for the identification of lichen products. Journal of Chromatography 46: 85–93. http://dx.doi.org/10.1016/S0021-9673(00)83967-9

Feuerstein SC, Cunha-Dias IPR, Aptroot A, Eliasaro S, Cáceres MES. 2014. Three new *Diorygma* (*Graphidaceae*) species from Brazil, with a revised world key. The Lichenologist 46(6): 753–761. http://dx.doi.org/10.1017/S002428291400036X

Jia ZF, Wei JC. 2016. Flora lichenum sinicorum – Vol.13, *Ostropales* (I). Science Press, Beijing. 210 p.

Kalb K, Staiger B, Elix JA. 2004. A monograph of the lichen genus *Diorygma* – a first attempt. Symbolae Botanicae Upsalienses 34 (1): 133–181.

Lamb IM. 1963. Index Nominum Lichenum inter Annos 1932 et 1960 Divulgatorum. The Ronald Press Company, New York. 809 p.

Lima EL, Maia LC, Aptroot A, Cáceres MES. 2013. New lichen species from Vale do Catimbau, Pernambuco, Brazil. The Bryologist 116(4): 327-329. http://dx.doi.org/10.1639/0007-2745-116.4.327

Makhija U, Chitale G, Sharma B 2009. New species and new records of *Diorygma* (*Graphidaceae*) from India: species with convergent exciples. Mycotaxon 109: 379–392. http://dx.doi.org/10.5248/109.379

Meng QF, Wei JC. 2008. A lichen genus *Diorygma* (*Graphidaceae*, *Ascomycota*) in China. Mycosystema 27: 525–531. http://dx.doi.org/10.1017/S002428291300025X

Nakanishi M, Kashiwadani H & Moon KH. 2003. Taxonomical notes on Japanese *Graphidaceae* (*Ascomycotina*), including some new combinations. Bulletin of the National Science Museum (Tokyo), Series B (Botany) 29(2): 83–90.

Sharma B, Khadilkar P. 2012. Four new species of *Diorygma* from India. Mycotaxon 119: 1–10. http://dx.doi.org/10.5248/119.1

Sharma B, Makhija U. 2009a. Four new species in the lichen genus *Diorygma*. Mycotaxon 107: 87–94. http://dx.doi.org/10.5248/107.87

Sharma B, Makhija U. 2009b. New species and new reports of *Diorygma* (lichenized *Ascomycotina*, *Graphidaceae*) from India. Mycotaxon 109: 209–217. http://dx.doi.org/10.5248/109.209

Staiger B. 2002. Die Flechtenfamilie *Graphidaceae*: Studien in Richtung einer natürlicheren Gliederung. Bibliotheca Lichenologica 85: 1–526.

Sutjaritturakan J, Saipunkaew W, Boonpragob K, Kalb K. 2014. New species of *Graphidaceae* (*Ostropales*, *Lecanoromycetes*) from southern Thailand. Phytotaxa 189(1): 312–324. http://dx.doi.org/10.11646/phytotaxa.189.1.22

Thrower SL. 1988. Hong Kong lichens. Urban Council Publication, Hong Kong. 193 p.

Wang Yang JR, Lai MJ. 1973. A checklist of the lichens of Taiwan. Taiwania l8(1): 83–104. http://dx.doi.org/10.6165/tai.1973.18.83

Wei JC. 1991. An enumeration of lichens in China. International Academic Publishers, Beijing. 278 p.

Wei JC, Jia ZF, Wu XL. 2013. An investigation of lichen diversity from Hainan Island of China and prospect of the R & D of their resources. Journal of Fungal Research 11(4): 224–238 (in Chinese).

White FJ, James PW. 1985. A new guide to microchemical techniques for the identification of lichen substances. British Lichen Society Bulletin 57 (Suppl.): 1–41.

Wu JN, Qian ZG. 1989. Lichens. 158-226, in Xu BS (ed.): Cryptogamic flora of the Yangtze Delta and adjacent regions. Shanghai Scientific & Technical Publisher, Shanghai (in Chinese).

Zahlbruckner A. 1933. Flechten der Insel Formosa. Repertorium Novarum Specierum Regni Vegetabilis 31: 194–224. http://dx.doi.org/10.1002/fedr.19330311108